

## A Comparison of Dental Hygienists' Salaries to State Dental Supervision Levels

April Catlett, RDH, BHSA, MDH, PhD

### Introduction

Dental hygiene supervision is defined as direct, general or direct access and determined by state practice act laws. Although different states allow a variety of procedures and possible limitations on dental hygiene services, the Academy of General Dentistry and the American Dental Hygienists' Association define direct supervision as "the dentist needs to be present to provide services," general supervision as "the dentist needs to authorize prior to services, but need not be present" and direct access as "the dental hygienist can provide services as he or she determines appropriate without specific authorization."<sup>1,2</sup> The dental hygiene profession does not have common national standards regarding practice restrictions and the level of dental supervision that is required to provide dental care to patients professionally. Some states require direct supervision by a dentist, which mandates that a dentist is on the premises while dental hygiene preventive care is being provided. Some states require general supervision, which requires that the dentist authorize dental hygiene procedures. General supervision, however, is different for each state and varies depending on state practice act language. For instance, dental hygienists may be limited to a set number of days annually without dentist supervision. Thirty five states allow dental hygienists to practice under less restrictive supervision laws. Unsupervised dental hygiene care given in certain settings outside the dental office is termed direct access.<sup>3</sup> To date, there are no studies that have examined if there is a difference in registered dental hygiene compensation or average salaries. Therefore, this study examined the 3 different levels of dental supervision that are required within the U.S.

### Abstract

**Purpose:** The purpose of this study is to evaluate the effect of dental supervision on registered dental hygienists' salaries in the 50 states and District of Columbia by comparing the average dental hygiene salaries from the largest metropolitan city within each state from May 2011, the most recent valid data, in relation to the required level of dental supervision.

**Methods:** A retrospective contrasted-group quasi-experimental design analysis was conducted using the most current mean dental hygiene salaries for the largest metropolitan city within each state and the District of Columbia which was matched to the appropriate dental supervision level. In addition, a dental assisting salary control group was utilized and correlated to the appropriate dental hygienist salary in the same metropolitan city and state. Samples were obtained from the U.S. Department of Labor. A multivariate analysis of variance (MANOVA) statistical analysis was utilized to assess the relationship of the 5 levels of dentist supervision, with the registered dental hygienist salaries. The MANOVA analysis was also utilized to assess the control group, dental assistant salaries.

**Results:** No statistically significant results were found among the dental supervision levels on the measures of dental hygiene salaries and dental assistant salaries. Wilks's  $\Lambda=0.81$ ,  $F(8, 90)=1.29$ ,  $p=0.26$ . Analyses of variances (ANOVA) on the dependent variables were also conducted as follow-up tests to the MANOVA.

**Conclusion:** Study results suggest dental hygienists who are required to have a dentist on the premises to complete any dental treatment obtain similar salaries to those dental hygienists who are allowed to work in some settings unsupervised by a dentist. Therefore, dental supervision does not seem to have an impact on dental hygienists' salaries.

**Keywords:** dental hygiene salaries, supervision level, access to dental care, autonomy

This study supports the NDHRA priority area, **Health Promotion/Disease Prevention:** Identify, describe and explain mechanisms that promote access to oral health care, e.g., financial, physical, transportation.

### Methods and Materials

This research study utilized a quasi-experimental design which used a contrast-group as a method to control internal validity.<sup>4</sup> This design allows registered dental hygienists to be assigned as members of separate categorical groups (directly supervised, generally supervised and dental hygienists allowed

direct access to patients).<sup>4</sup> The mean dental hygiene salaries for each metropolitan city and the District of Columbia were matched to the appropriate dental supervision level that is legal for its state. The dental assisting salary control groups were correlated to the appropriate dental hygiene salary in the same metropolitan city and state. Since data could not be randomly assigned, a quasi-experimental design was used which allows for the selection of random samples from the population which is how the samples were obtained by the U.S. Department of Labor (USDL).<sup>4,5</sup>

In order to address the differences in the state levels of dental supervision for dental hygienists, additional categories of the independent variable were added to the study. The results of this addition lead to 5 independent variables, which are:<sup>6</sup>

- Direct Supervision
- Direct Supervision with some General Supervision procedures allowed
- General Supervision
- Direct Access with some General Supervision procedures required
- Direct Access

The supervision levels for a dental prophylaxis were placed in an ordinal scale according to the level of required dental supervision for dental hygienists as determined in each state dental practice act. Mean salaries were selected from a metropolitan city within each state and the District of Columbia in order to standardize the statistics since states can have a substantial variation in size, population and number of rural areas. In addition, mean dental assistant salaries from the same metropolitan city and the District of Columbia were used as a control group since different areas of the U.S. have different cost of living levels.<sup>7</sup>

Using SPSS software, a multivariate analysis of variance (MANOVA) procedure was used to assess the relationship of the independent variables, which are the 5 levels of dental hygiene supervision, with a dependent variable, the dental hygienists' salaries and the control group of dental assistants' salaries, by conducting between-subject analyses.<sup>8</sup> In order to reduce the possibility of variable errors, the research design included a parallel-forms technique that ensured that the data was entered correctly which was completed by performing the test twice on the same variables and correlating the results to ensure accuracy.<sup>4</sup>

The sample of May 2011 registered dental hygienists' and dental assistants' wages were obtained through the USDL State Occupational Employment

and Wage Estimates (OES) website.<sup>9</sup> The state metropolitan cities used for each sample were located and obtained from the USDL website based on population size in order to obtain similar-sized cities for the study. The level of required dental hygiene supervision for each sample state was obtained from 2 charts developed by the American Dental Hygienists' Association and the Academy of General Dentistry.<sup>1,2</sup> The USDL biannually mails the OES survey to sampled employers, which measures employment and wage rates every 6 months in May and November.<sup>9</sup> The OES survey is funded by the Bureau of Labor Statistics (BLS), which also provides the procedures and technical support, while the State Workforce Agency collects most of the data.<sup>9</sup> Each OES survey estimates are based on responses from the previous 6 semiannual surveys that are collected over a 3 year timeframe. The overall national response rate for the 6 semiannual surveys is 73.3% for employment and wages.<sup>9</sup>

The OES survey obtained its sampling from state unemployment insurance files for the USDL State OES.<sup>9</sup> The OES survey sample is stratified by metropolitan and non-metropolitan areas, industries, and size.<sup>9</sup> According to the USDL, larger employers and establishments are more likely to be selected for participation in the survey than smaller employers and establishments.<sup>9</sup> However, in the field of dentistry, quota sampling is not a validity factor, since 176,670 (96%) of all dental hygienists and 296,810 (92%) of all dental assistants in the U.S. are employed by a self-employed dentist in a dental office.<sup>9</sup>

OES receives wage data in 12 intervals for each occupation. Sampled employers are asked to report the number of employees paid within a specific wage interval by both hourly rates and the corresponding annual rates.<sup>9</sup> The annual rate is calculated by multiplying the hourly wage rate by 2,080 hours.<sup>9</sup> The 6 survey sample that is obtained for each occupation allows for the production of estimates at detailed levels of occupation and location. Significant reductions in sampling errors are obtained by combining the 6 surveys of data for each occupation by updating the 5 previous surveys to the current survey's reference period according to the average movement of its broader occupational division.<sup>9</sup>

There is approximately a 20% non-response rate to the OES survey every 6 months.<sup>9</sup> Non-responses can be attributed to people who are ill, those "not found" (which can include people who have moved or who are inaccessible) and "refusals" (which include people who refuse to cooperate or answer the survey).<sup>9</sup> Therefore, a "nearest neighbor" imputation procedure is used to credit missing occupational employment totals and a variant of mean

Table I: Mean Dental Hygienist Salaries in May 2011 and State Dental Supervision Levels for a Dental Hygiene Prophylaxis (Part I)

Metropolitan City, State	Employment Size of Dental Hygienists	Dental Hygienists Mean Salary	Supervision Level for Prophylaxis
Birmingham, Alabama	840	44,410	D
Anchorage, Alaska	210	84,300	G/A
Phoenix, Arizona	2,200	80,470	G/A
Little Rock, Arkansas	360	59,650	G/A
Los Angeles, California	4,280	93,130	G/A
Denver, Colorado	1,940	77,660	A
Hartford, Connecticut	940	77,090	G/A
Dover, Delaware	100	70,170	G
District of Columbia	2,700	90,500	G
Miami, Florida	1,150	49,660	G/A
Atlanta, Georgia	2,830	70,020	D
Honolulu, Hawaii	770	66,500	D/G
Boise, Idaho	630	68,420	G
Chicago, Illinois	5,620	62,250	G
Indianapolis, Indiana	1,040	71,350	D/G
Des Moines, Iowa	450	67,300	G/A
Wichita, Kansas	370	64,350	G/A
Louisville, Kentucky	540	59,340	G/A
Baton Rouge, Louisiana	320	52,150	D/G
Portland, Maine	440	74,260	G/A
Baltimore, Maryland	1,200	73,940	G
Boston, Massachusetts	4,310	78,510	G/A
Detroit, Michigan	1,120	65,810	G/A
Minneapolis, Minnesota	2,820	72,480	G/A
Jackson, Mississippi	230	47,910	D
Saint Louis, Missouri	1,630	70,870	G/A

Note: Table I adapted from USDL<sup>5</sup> and American Dental Hygienists' Association.<sup>2</sup>

imputation is completed to credit missing wage distributions.<sup>9</sup> The sampled employers are weighted to represent all employers of an occupation for each survey period. Weights are additionally adjusted by the ratio of employment totals from the BLS Quarterly Census of Employment and Wages to OES survey employment totals by the USDL.<sup>9</sup>

This study examined the dental hygiene and dental assistant salaries from a metropolitan city within all 50 states and the District of Columbia from this collected USDL data. Each sample of dental hygienists and dental assistants consisted of a sample larger than 30 participants to ensure validity. The smallest sample size of dental hygienists and dental assistants were both in Cheyenne, Wyoming with a sample size of 80 dental hygienists and a sample

size of 110 dental assistants (Table I).<sup>7</sup> The number of states with Direct Supervision had 3 samples, the Direct/General Supervision had 5 samples and the Direct Access Supervision sample size contained 1 sample. These small sample sizes could have affected the statistical test results. A MANOVA was conducted to determine the effect of dental supervision on the 2 dependent variables, the dental hygienists' and dental assistants' salaries for 50 metropolitan cities within each state and the District of Columbia.

## Results

With a 97.5% confidence level, non-significant differences were found among the dental supervision levels on the 2 dependent measures, dental hygienists' and dental assistants' salaries, Wilks's

Table I: Mean Dental Hygienist Salaries in May 2011 and State Dental Supervision Levels for a Dental Hygiene Prophylaxis (Part II)

Metropolitan City, State	Employment Size of Dental Hygienists	Dental Hygienists Mean Salary	Supervision Level for Prophylaxis
Billings, Montana	200	68,930	G/A
Omaha, Nebraska	380	68,280	G/A
Las Vegas, Nevada	850	87,110	G/A
Manchester, New Hampshire	110	76,850	G/A
Newark, New Jersey	1,180	82,410	D/G
Albuquerque, New Mexico	510	73,560	G/A
Buffalo, New York	1,120	51,450	G
Charlotte, North Carolina	1,340	68,320	D/G
Fargo, North Dakota	240	50,330	G
Cincinnati, Ohio	1,380	64,900	G/A
Oklahoma City, Oklahoma	650	58,400	G
Portland, Oregon	1,970	80,760	G/A
Pittsburgh, Pennsylvania	1,840	52,660	G/A
Providence, Rhode Island	1,100	72,470	G/A
Columbia, South Carolina	460	57,170	G
Sioux Falls, South Dakota	140	58,730	G
Memphis, Tennessee	620	63,260	G
Dallas, Texas	2,910	74,530	G/A
Salt Lake City, Utah	950	67,800	G
Burlington, Vermont	150	71,540	G/A
Virginia Beach, Virginia	930	73,310	G/A
Seattle, Washington	2,660	94,000	G/A
Charleston, West Virginia	230	52,720	G/A
Milwaukee, Wisconsin	1,300	60,550	G/A
Cheyenne, Wyoming	80	67,160	G

Note: Table I adapted from USDL<sup>5</sup> and American Dental Hygienists' Association.<sup>2</sup>

$\Lambda=0.81$ ,  $F(8,90)=1.29$ ,  $p=0.26$ . Analyses of variances (ANOVA) on the dependent variables were conducted as follow-up tests to the MANOVA. Using the Dunnett-Bonferroni methods, each ANOVA was tested at the 0.025 level. Post hoc tests did not show a significant difference between the dental hygienists' salaries or the dental assistants' salaries with  $p>0.05$ . Table II shows that the mean dental hygienists' salary increased and decreased correspondingly to the control group of dental assistant salary means.

## Discussion

These study results show that as dental hygienists' mean salary increased and decreased, the control group (dental assistants' mean salary)

also increased and decreased. Although the mean salaries for dental hygienists increased as the level of dental supervision decreased, it appears to be associated with the cost of living since the control group's mean salaries for dental assistants raised and lowered at a similar percentage rate (Table II).

Employment is defined by the USDL as the number of workers who can be classified as full-time or part-time employees, including workers on paid vacation or any other type of paid leave.<sup>9</sup> In 2010, approximately 38% of dental hygienists worked full time.<sup>5</sup> According to the USDL, there were approximately 184,110 dental hygienists employed in the U.S. in May 2012, with the majority of them working in metropolitan areas.<sup>5</sup> A distinctive fea-

Table II: SPSS Mean Comparisons

Supervision Level	Number of States with Supervision Level	Average Dental Hygiene Salaries (Difference from Previous Level)	Average Dental Assistant Salaries (Control Group) (Difference from Previous Level)
Direct	3	\$54,113 (N/A)	\$32,493 (N/A)
Direct/General	5	\$68,146 (+1.28%)	\$35,124 (+1.08%)
General	13	\$64,583 (-0.95%)	\$33,349 (-0.95%)
General/Access	28	\$71,360 (+1.10%)	\$35,468 (+1.06%)
Direct Access	1	\$77,660 (+1.09%)	\$40,580 (+1.14%)

ture of dental hygiene employment is a flexible schedule. More than one-half of all dental hygienists work part time for only a few days a week and many dental hygienists work for more than one dentist weekly.<sup>5</sup>

When trying to determine a cause-and-effect relationship between dental hygienists' salaries and supervision levels, many other factors need to be taken into consideration. For example, recent legislation expanding the role of dental hygienists in several states may be increasing dental hygiene salaries in these areas. In addition, there has been a pronounced geographic shift in the American population with southern and western states increasing in population and the number of oral health personnel which may be increasing the health care salaries in these areas.<sup>10</sup> There has also been a recent increase in the number of mobile and teledentistry services brought to areas where there is a need for dental services in underserved areas in recent years which may also be affecting dental hygiene salaries.<sup>11</sup> These factors may be causing a higher demand for registered dental hygienists which can be increasing salaries.<sup>11</sup> Similarly, a study in 1991 involving registered nurses showed that increasing wages increased the supply of individuals who were available in the labor market.<sup>11</sup> However, many dental hygienists are now choosing to work part-time.<sup>5</sup> And with dental hygiene being predominantly a female profession similar to nursing, the presence of children may be decreasing the probability of working full-time as a registered dental hygienist.<sup>11</sup> All of these factors need to be taken into consideration when looking at the relationship between dental hygiene salaries, the level of dental supervision, and the mean differences that were

assessed for analysis rather than a correlation analysis.

The relationship between salaries and supervision levels cannot be expressed by a universal law because not every case of a change in dental supervision level will bring about a change in dental hygiene salary level.<sup>4</sup> These study results can only suggest that there is a high probability that a large percentage of cases investigated led to these results because they are derived from probabilistic generalizations.<sup>4</sup> The major limitation of probabilistic generalizations is that conclusions about specific cases cannot be drawn with complete certainty.<sup>4</sup> Therefore, these results will only provide probabilistic generalizations and there are other aspects of dental supervision levels for dental hygienists that are more important such as access to preventive dental care for the poor and underserved populations within the U.S. that are not addressed in this study.<sup>4</sup>

## Conclusion

This study suggests that there is no significant difference between compensation salaries between dental hygienists who work under direct supervision, general supervision or direct access state practice acts. Practical contributions for this study include a tentative empirical generalization that will need to be further investigated by future studies. This study may be of interest to dental personnel and lawmakers in the U.S. who are concerned in how dental supervision levels may affect dental hygienist compensation salaries.

*April Catlett, RDH, BHSA, MDH, PhD, is the program chair of the Central Georgia Technical College Dental Hygiene Program.*

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